Packed-Column Supercritical Fluid Chromatography with APCI/MS Detection – Development and Applications

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Use of SFC for the analysis of systems which are not suited to GC or HPLC analysis (involatile or thermally sensitive analytes requiring a range of detection systems) is well-established. Uur development of an interface between SFC and atmospheric-pressure chemical ionization mass spectrometry (APCI/MS) has provided a versatile and informative analytical system which can be used in a wide range of applications.

Polymer Additives: We will present results on both SFE and packed-column SFC-APCI/MS on the identification and quantitation of 25 polymer additives, covering a wide range of chemical types, polarities and molecular weights. Limits of detection down to 68 pg. on-column were achieved (for Tinuvin 327), in addition to definitive identification of additives (and their breakdown products) in polyethylene samples.

Explosives: Very promising preliminary results have been obtained on the analysis of explosives (nitrotoluenes, PETN, RDX, HMX), including trace analysis from persons and apparatus involved in handling these materials.

β-Agonists: There is a need for rapid and reliable analyses for these compounds, which can be used improperly in food production and by athletes. SFC-APCI/MS of these polar species (e.g. clenbuterol, salbutamol, terbutaline and fenoterol) has been achieved for the first time, showing low detection limits. Application to milk samples containing a mixture of β-agonists has shown that 'real' samples are amenable to this technique.

Pesticide residues: SFE, followed by SFC-APCI/MS, has shown that organo-phosphate pesticides can be detected at significant concentrations in airborne dust samples collected in Central Asia (Turkmenistan). These findings have great significance in addressing ecological and public health issues in this former Soviet republic.